THE EFFECTS OF JOB DESIGN ON EMPLOYEES' KNOWLEDGE CONTRIBUTION TO ELECTRONIC REPOSITORIES

Completed Research Paper

L. G. Pee
Tokyo Institute of Technology
2-12-1-W9-120 Oookayama, Meguro-ku, Tokyo, Japan, 152-8552
peelg.aa@m.titech.ac.jp

Abstract

Motivating employees to contribute knowledge has been a daunting challenge in knowledge management. This study examines how job design influences employees' knowledge contribution to electronic repositories. Based on Warr's Vitamin Model, we posit that the job autonomy, skill variety, task feedback, task identity, and task significance aspects of job design influence employees' knowledge contribution to electronic repositories through shaping their affective commitment. Results from a survey of 163 professionals indicate that while job autonomy and task significance have positive linear effects, skill variety and task identity have curvilinear effects such that increasing their levels initially improves employees' affective commitment but at very high levels they have negative impacts. This study contributes to theoretical development by identifying the differential effects of various aspects of job design. The findings suggest that managers should be mindful of the double-edged quality of some job characteristics in promoting employees' knowledge contribution to electronic repositories.

Keywords: Job Design, Affective Commitment, Knowledge Contribution, Warr's Vitamin Model, Curvilinear Effect

Introduction

Electronic knowledge repositories have an important role in facilitating the efficient capturing and dissemination of knowledge in organizations' knowledge management initiatives (Argote and Miron-Spektor 2011). They serve as a supra-individual base of organizations' memory that can be reused and further developed through learning to improve organizational performance. It is therefore vital for organizations to effectively manage their knowledge repositories. It is widely recognized that the success of a knowledge repository depends heavily on employees' willingness to contribute their knowledge since effective knowledge dissemination and reuse cannot occur if employees do not actively provide content (Kankanhalli et al. 2005). Hence, many studies have examined knowledge contribution and identified various antecedents, including cost and benefit considerations, contributor's characteristics, social and cultural factors, and system characteristics (e.g., He and Wei 2009; Kankanhalli et al. 2005; Muller et al. 2005; Watson and Hewett 2006). Research on intra-organizational knowledge contribution in more general settings (i.e., not restricted to electronic knowledge repositories) has also provided some insights. Other than the antecedents mentioned earlier, it highlighted that job-related factors such as job design and organizational commitment (e.g., Foss et al. 2009; Lin 2007) may also be important. However, the effects of these job-related factors on knowledge contribution to electronic repositories remain largely unknown.

Knowledge contribution to electronic repositories is different from other forms of knowledge contribution in that the contributor may not always have information about the beneficiaries of their contribution and their contributions may become available to both intended and unintended readers once posted. There are often little tangible incentives for the contributors and the beneficiaries have the option of not providing feedback or transmitting social cues (e.g., gratitude) even if they benefited from the contribution (Peddibhotla and Subramani 2007). However, employees who contribute to electronic repositories appear to expend their time and effort despite these peculiarities. This suggests that factors beyond rational cost and benefit evaluations may significantly motivate knowledge contribution to electronic repositories. Similarly, King and Marks (2008) note that the rational view may not account for the variation in contributions to a knowledge management system. Employees' knowledge contribution to electronic repositories may be largely a pro-social organizational behavior (Jarvenpaa and Staples 2001) which is more strongly engendered by affective commitment (O'Reilly III and Chatman 1986). Recognizing the lack of empirical studies on the effect of affective commitment on knowledge contribution to electronic repositories and considering its potential significance in the context, one of the objectives of this study is to examine the role of affective commitment.

As mentioned earlier, job design has been found to influence intra-organizational knowledge contribution (e.g., Gagné 2009; Hislop 2003). In organizational research, job design has also been found to be an important determinant of employees' affective commitment (Dunham et al. 1994). Many studies have demonstrated that enriching job design by increasing job autonomy, skill variety, task feedback, task identity, and task significance (Hackman and Oldham 1976) improves employees' affective commitment (e.g., Dunham et al. 1994). Nevertheless, there is also increasing evidence that at very high levels, these aspects of job design may over stimulate employees and weaken their affective wellbeing (Johns 2010; Warr 1994; Xie and Johns 1995). To understand this phenomenon, Warr (1994) draws on the analogy of vitamin consumption to propose a model of work and affective wellbeing. It is posited that certain job characteristics have an ∩-shaped effect on affective wellbeing, just as the overdose of certain vitamins have detrimental effects on health. In essence, the model emphasizes that job design has the best effect when it is done in moderation. Despite the intuitive appeal of the idea, there is a paucity of empirical studies on the curvilinear effect of job design in information systems (Morris and Venkatesh 2010) and knowledge management research. To date, there is yet any published study applying Warr's model to understand the relationship between job design and employees' knowledge contribution. This study seeks to address this gap.

Overall, this study attempts to address the research question of "*how do affective commitment and job design influence employees' knowledge contribution to electronic repositories?*" Based on Warr's (1994) model and prior research on human resource management and knowledge management, we examine whether job design influences employees' knowledge contribution to electronic repositories through its linear and curvilinear effects on affective commitment. As will be detailed later, findings based on a

survey of 163 employees working in knowledge-intensive professions indicate that affective commitment fully mediates the effect of job design on knowledge contribution. Among the job characteristics, skill variety and task identity have significant ∩-shaped effects on affective commitment while job autonomy and task significance have positive linear effects. This study contributes to theoretical development by shedding light on the differential effects of various aspects of job design and providing initial empirical evidence for the mechanism through which job design influences knowledge contribution to electronic repositories. The findings also highlight that job design, though more amenable to purposeful management in practice, needs to be carried out carefully as it can backfire and hamper employees' willingness to contribute knowledge.

Conceptual Background

Research on Knowledge Contribution to Electronic Repositories

Since the topic of interest of this study is employees' knowledge contribution to electronic repositories, we reviewed prior studies on the topic to identify gaps in existing research. The review sought to identify factors that had been hypothesized to influence individuals' knowledge contribution to electronic repositories and their observed effects (i.e., whether each factor was found to have positive, negative, interaction, or insignificant effect). Based on the suggestions of Webster and Watson (2002) for conducting literature review, the factors identified were categorized conceptually into five categories: 1) benefits of knowledge contribution, 2) costs of knowledge contribution, 3) contributor's characteristics, 4) social and cultural factors, and 5) system's characteristics (see Table 1). The factors were also organized based on whether their observed effects. Each category of factors will be briefly explained next.

Benefits may motivate employees to contribute knowledge to repositories intrinsically or extrinsically. Benefits that have been found to have significant effect include enjoyment in helping others (He and Wei 2009; Kankanhalli et al. 2005), opportunity for advancement (Watson and Hewett 2006), and organizational reward/incentive (Kankanhalli et al. 2005; Muller et al. 2005). *Costs* may incur in the form of opportunity costs (e.g., time and effort required to codify and input knowledge) and actual loss of resources (e.g., loss of power and unique value) (Kankanhalli et al. 2005). *Contributor's characteristics* such as knowledge self-efficacy (Kankanhalli et al. 2005) and job tenure (Watson and Hewett 2006) also have significant influence on knowledge contribution. Employees are likely to contribute knowledge when they believe that their knowledge and accumulated experience can help to solve job-related problems, improve work efficiency, or make a difference to their organization (Kankanhalli et al. 2005).

Beyond the consideration of costs and benefits to oneself and one's efficacy to contribute knowledge, *social and cultural factors* shape the context of knowledge contribution and have been shown to have significant effects. For example, social constituents such as managers and supervisors influence employees' belief of whether one is expected to contribute knowledge to electronic repositories (He and Wei 2009; King and Marks 2008). With regard to culture, employees working in organizations with larger power distance have been found to be more likely to contribute knowledge to repositories because in such organizations power distribution is more fixed and knowledge hoarding is less likely to increase power (Muller et al. 2005). On the contrary, social and cultural factors such as identification, image, reciprocity (Kankanhalli et al. 2005), individualism, and uncertainty avoidance (Muller et al. 2005) have been shown to have insignificant effect.

System characteristics also constitute an important category of factors influencing employees' knowledge contribution to electronic repositories. Prior studies have shown that a repository's knowledge validation process transparency (i.e., whether the process is well-documented, detailed, and standardized) (Durcikova and Gray 2009), ease of use, and usefulness (King and Marks 2008) facilitate knowledge contribution. On the other hand, a system with restrictive knowledge validation process is more likely to reject knowledge contributions that do not meet its requirements and may discourage employees to expend effort to contribute again in future (Durcikova and Gray 2009).

Table 1. Review of Factors Influencing Individuals' Knowledge Contribution to Electronic Repositories

Observed Effect Category	Positive Effect	Negative Effect	Insignificant Effect	Interaction Effect
Benefits of Knowledge Contribution	-Advancement (Watson and Hewett 2006) -Enjoyment in helping others (He and Wei 2009; Kankanhalli et al. 2005) -Organizational reward/incentive (Kankanhalli et al. 2005; Muller et al. 2005)	None	None	-Codification effort*Generalized trust (Kankanhalli et al. 2005) -Organizational reward*Identification (Kankanhalli et al. 2005) -Reciprocity*Pro-sharing norms (Kankanhalli et al. 2005)
Costs of Knowledge Contribution	None	-Contribution effort (He and Wei 2009)	-Codification effort (He and Wei 2009; Kankanhalli et al. 2005) -Loss of knowledge power (Kankanhalli et al. 2005)	
Contributor's Characteristics	-Knowledge self-efficacy (Kankanhalli et al. 2005) -Tenure (Watson and Hewett 2006)	None	None	
Social and Cultural Factors	-Management influence (He and Wei 2009) -Supervisory control (King and Marks 2008) -Organization support (King and Marks 2008) -Social relationship (trust, norm, and tie strength) (He and Wei 2009) -Power distance (Muller et al. 2005)	None	-Generalized trust (Kankanhalli et al. 2005) -Identification (Kankanhalli et al. 2005) -Image (Kankanhalli et al. 2005) -Pro-sharing norms (Kankanhalli et al. 2005) -Reciprocity (Kankanhalli et al. 2005) -Individualism (Muller et al. 2005) -Uncertainty avoidance (Muller et al. 2005)	
System's Characteristics	-Perceived validation process transparency (Durcikova and Gray 2009) -System ease of use (King and Marks 2008) -System usefulness (King and Marks 2008)	-Perceived validation process restrictiveness (Durcikova and Gray 2009)	-Perceived validation process duration (Durcikova and Gray 2009)	

From the review, we observed that prior research on knowledge contribution to electronic repositories has not examined the effects of job design. Studies that conceptualized knowledge contribution more generally (i.e., intra-organizational knowledge contribution through any means such as face-to-face meetings, reports, phone calls) have begun to find that job design may have an important role in knowledge contribution. For example, Foss et al. (2009) found that job autonomy, task identity, and task feedback significantly influences employees' sending of knowledge to colleagues. It is necessary to ascertain job design's effect in the context of knowledge repository because findings related to intra-organizational knowledge contribution are not always generalizable to knowledge contribution to electronic repositories. For example, extrinsic rewards have been found to have negative influence on employees' intention to provide knowledge in more general contexts (Bock et al. 2005) but positive effect on knowledge contribution to electronic repositories (Kankanhalli et al. 2005); Enjoyment in helping others has been found to have insignificant effect on intra-organizational knowledge contribution (Wasko and Faraj 2005) but significant effect on knowledge contribution to electronic repositories (He and Wei 2009; Kankanhalli et al. 2005). As mentioned earlier, the nature of knowledge contribution to electronic repositories has some peculiarities that differentiate it from other forms of knowledge contribution. It is therefore interesting to examine whether job design has a significant impact in the context of electronic knowledge repositories. The concept of job design will be described next.

Job Design

Hackman and Oldham (1976) identified five important aspects of job design that influence employees' knowledge of the results of their work activities, perceived responsibility for the outcomes of their work, and perceived meaningfulness of their work. They postulate that an individual experiences positive affect to the extent that one "learns (knowledge of results) that he personally (perceived responsibility) has performed well on a task that he cares about (perceived meaningfulness)" (p. 255). Specifically, the five aspects are job autonomy, skill variety, task feedback, task identity, and task significance.

Job autonomy refers to the degree to which a job provides substantial freedom, independence, and discretion to an individual in scheduling work and determining the procedures for carrying out work (Hackman and Oldham 1976). In high-autonomy jobs, job outcome depends more on individual's efforts, initiatives, and decisions rather than on the adequacy of instructions from supervisors or standard operating procedures. Therefore, individuals working on jobs with high autonomy are likely to feel a stronger responsibility for their job outcomes. Increase in job autonomy has been found to intrinsically motivate employees to contribute knowledge (de Vries et al. 2006; Foss et al. 2009).

Skill variety refers to the degree to which a job requires a variety of different activities in carrying out work, which involves the use of a number of different skills and talents of an individual (Hackman and Oldham 1976). When a job draws upon several skills of an individual, the individual is likely to experience the feeling of meaningfulness psychologically. In support, Nair and Vohra (2010) found that knowledge workers who perceive their job to lack skill variety are likely to feel alienated and are less likely to put effort into work or care about events at their workplace. de Vries et al. (2006) found that the level of variation in work is positively related to an employee's contribution of knowledge.

Task feedback refers to the degree to which carrying out the work activities required by a job results in an individual obtaining direct and clear information about the effectiveness of his or her performance (Hackman and Oldham 1976). Receiving feedback on one's performance is a critical element of feeling competent and is thus a strong predictor of motivation (Deci et al. 1999). In line with this, Foss et al. (2009) found that receiving positive task feedback enhances employees' motivation which in turn increases their intra-organizational knowledge contribution.

Task identity refers to the degree to which a job requires the completion of a "whole" and identifiable piece of work, that is, doing a job from beginning to end with a visible outcome (Hackman and Oldham 1976). A job with high task identity allows an employee to follow through the main stages to "provide a complete unit of service" (Hackman and Oldham 1976, p. 257) instead of just part of it. When employees identify with their tasks, they may internalize external demands and expectations and need less external contingencies to prompt the desired behavior (Gagné 2009).

Task significance refers to the degree to which a job has a substantial impact on the lives or work of other people, whether within the immediate organization or in the external environment (Hackman and

Oldham 1976). A meta analysis has shown that task significance enhances motivation by enabling employees to experience their work as more meaningful (Morgeson and Humphrey 2006). This may entice employees to contribute knowledge to electronic repositories. In a similar vein, Grant (2011) links task significance to pro-social behavior, which refers to the act of freely giving one's time, knowledge, or skills for the benefit of other people, groups, or causes. This suggests that increase in task significance is likely to encourage knowledge contribution.

In general, prior research has predominantly focused on assessing the direct and positive effect of an enriched job design (i.e., job characterized by high job autonomy, skill variety, task feedback, task identity, and task significance) and assumed that the more enriched a job is, the more the employee will be motivated to contribute knowledge (e.g., Foss et al. 2009). However, human resource management researchers have recognized that an excessively enriched job design may have counter effects on employees' psychological state (Champoux 1980; Johns 2010; Xie and Johns 1995). This suggests that enriching job design may not be the silver bullet for motivating employees to contribute knowledge. A theoretical model explicating the non-linear effects of job design is described next.

Warr's Vitamin Model

Warr's vitamin model suggests that job design influences employees' affective wellbeing in a way that is analogous to the non-linear effects that vitamins have on people's physical health (Warr 1994). In general, vitamin intake initially improves health (area A in Figure 1) but beyond a particular level of intake no further improvement will be observed (area B in Figure 1). Continued intake of vitamins beyond the level may produce a constant effect or additional decrement effect (area C in Figure 1). A *constant effect* occurs when health neither improves nor deteriorates. An *additional decrement effect* occurs when an overdose causes decline in health. Accordingly, Warr (1994) suggests that various job characteristics have a paradoxical double-edged quality. It is expected that employees' affective wellbeing initially improves as the levels of job autonomy, skill variety, task feedback, task identity, and task significance increase. Beyond a certain level, increase in each job characteristic may have either a constant or additional decrement effect on affective wellbeing. Based on a study of 1,686 employees, Warr (1994) suggests that other than task significance, other job characteristics have an additional decrement effect. The additional decrement effect of the job characteristics may be explained by the theory of activation, which states that both under- and over- stimulation generate stress (Scott 1966) in the form of emotional exhaustion and anxiety (Xie and Johns 1995) that are likely to impact the affective wellbeing of employees. In essence, the model emphasizes that a balance in the level of various job characteristics is necessary to maintain affective wellbeing and very low or high levels are likely to be dysfunctional.

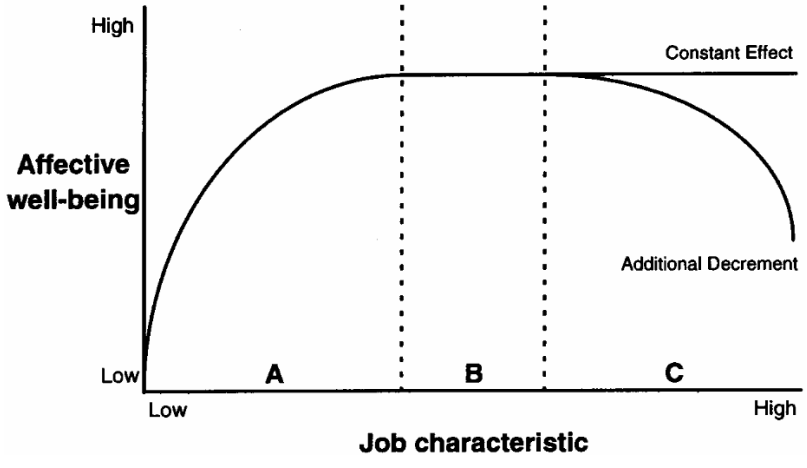

Figure 1. Warr's Vitamin Model

Prior studies have shown some empirical support for the curvilinear effect of job design. For example, Champoux (1980) found that job scope (measured as a sum of job autonomy, skill variety, task feedback,

task identity, and task significance) has a curvilinear effect on the affective responses of employees working in research and development organizations and federal agencies. In a similar vein, Xie and Johns (1995) showed that job scope has a U-shaped curvilinear relationship with stress measured in terms of emotional exhaustion and anxiety. Although there has been limited research examining the curvilinear effect of job design, these findings indicate that the effect of job design may be more complex than commonly believed. Information systems researchers have also suggested that it may be fruitful to examine the curvilinear effect of job design (e.g., Morris and Venkatesh 2010).

Affective wellbeing in Warr's Vitamin Model has been conceptualized in terms of fatigue, job attachment, job related-anxiety, job satisfaction, job-related depression, job-related strain, job-related tension, occupational burnout, and organizational commitment (De Jonge and Schaufeli 1998). Among them, job satisfaction and organizational commitment have been found to influence employees' intra-organizational knowledge contribution directly (e.g., Lin 2007) or indirectly (e.g., de Vries et al. 2006). Although job satisfaction and organizational commitment are strongly correlated (Meyer and Allen 1991), they differ conceptually (Mowday et al. 1979) and demonstrate discriminant validity (Mathieu and Farr 1991). Organizational commitment reflects a general *affective* response to the employing organization as a whole and emphasizes attachment to the organization and its goals and values whereas job satisfaction reflects one's response to specific and tangible aspects of one's job (Mowday et al. 1979). Therefore, we consider organizational commitment to be more suitable for representing affective wellbeing. Further, organizational commitment has been shown to be more stable than job satisfaction in that it develops slowly but consistently over time while job satisfaction reflects more immediate reactions to specific aspects of the work environment and is more transient (Mowday et al. 1979). In line with this, prior studies have shown that organizational commitment influences knowledge contribution directly (Lin 2007) whereas job satisfaction influences knowledge contribution through shaping employees' attitude (de Vries et al. 2006).

Organizational commitment encompasses the three components of affective, continuance, and normative commitment (Meyer and Allen 1991). *Affective commitment* refers to an employee's emotional attachment to, identification with, and involvement in the organization. *Continuance commitment* refers to an awareness of the costs associated with leaving the organization. *Normative commitment* reflects a feeling of obligation to continue employment. Among them, affective commitment has been found to be a strong predictor of employees' willingness to share knowledge whereas normative and continuance commitment do not have significant effects (Meyer and Allen 1991). Employees who *want* to belong to the organization (affective commitment) are likely to exert extra effort to maintain their membership in the organization than those who *need* to belong (continuance commitment) or *feel obligated* to belong (normative commitment). Affective commitment is also more strongly influenced by job characteristics whereas continuance commitment is influenced by the costs associated with leaving the organization and normative commitment is influenced by the internalization of normative pressures (Meyer and Allen 1991). Since the focus of this study is on the influence of job design on knowledge contribution to electronic repositories, we conceptualize affective wellbeing in Warr's Vitamin Model in terms of affective commitment.

Research Model and Hypotheses

The proposed model is presented in Figure 2. Based on Warr's Vitamin Model, we hypothesize that job autonomy, skill variety, task feedback, and task identity have an ∩-shaped relationship with affective commitment while task significance is positively related to affective commitment. Affective commitment, in turn, is expected to be positively related to employees' knowledge contribution to electronic repositories. The effects of age, education, gender, job position, and organization tenure will be controlled for in data analysis.

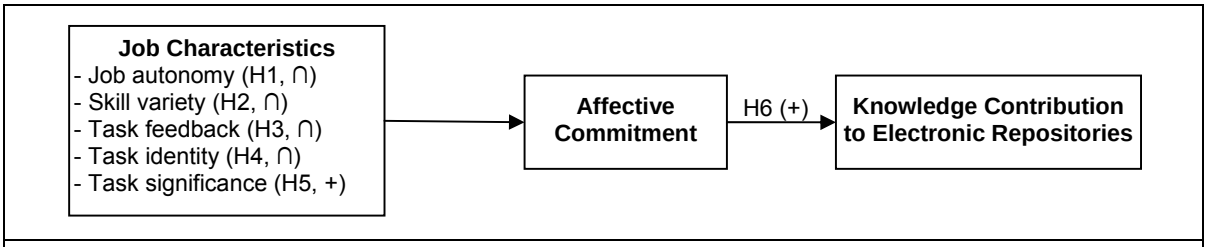

Figure 2. Proposed Research Model

Job autonomy refers to the degree to which a job provides substantial freedom, independence, and discretion to an individual in scheduling work and determining the procedures for carrying out work (Hackman and Oldham 1976). Warr's Vitamin Model suggests that job autonomy has an ∩-shaped relationship with affective commitment. That is, employees with low and high job autonomy are likely to have less affective commitment than employees with moderate job autonomy. Jobs with low autonomy often require the performer to follow rigid rules and procedures rather than using their own judgments at work. They also do not have the flexibility to structure work according to their circumstances and preferences. These suggest that jobs with low autonomy offer little personal control. Personal control refers to the amount of control that individuals believe they have over their environment to make it less threatening or more rewarding (Ganster and Fusilier 1989). It is a basic human need that has been shown to have strong effect on wellbeing (Sels et al. 2004). Employees working on jobs with low autonomy are likely to feel that their personal judgment and initiative are suppressed and they have little personal control. This may evoke opposition and resistance and lead employees to form negative attitudes (Naus et al. 2007). Although increasing job autonomy has been found to improve affective commitment effect (e.g., Ahuja et al. 2007), the improvement may not be monotonous. Jobs with high autonomy are unstructured and employees often need to make many decisions regarding how their work is carried out. Research on empowerment suggests that this may result in feelings of high uncertainty (Menon 1995) and causes stress (Honold 1997). Accordingly, we hypothesize that:

H1: When the level of job autonomy is low or high, employees' affective commitment is lower than when job autonomy is moderate.

Skill variety is defined as the degree to which a job requires a variety of different activities in carrying out work, which involves the use of a number of different skills and talents of an individual (Hackman and Oldham 1976). According to Warr's Vitamin Model, skill variety has an ∩-shaped relationship with affective commitment. A job that has very low skill variety is likely to be less stimulating and may result in boredom. For example, Fullagar and Kelloway (2009) suggest that if an activity does not challenge an individual's skills then one is likely to feel bored. Wiesner et al. (2005) found that employees working on jobs with low skill variety are likely to feel depressed. Therefore, they are unlikely to develop strong affective commitment for their organization. It has been observed that enhancing skill variety through means such as job rotation improves employees' affective commitment (Humphrey et al. 2007). However, very high skill variety may deplete employees' mental resources and lead to mental overload and increase job pressure (Chen and Chiu 2009; Xie and Johns 1995). Such mental strain is likely to result in low affective commitment. Therefore, we hypothesize that:

H2: When the level of skill variety is low or high, employees' affective commitment is lower than when skill variety is moderate.

Task feedback refers to the degree to which carrying out the work activities required by a job results in an individual obtaining direct and clear information about the effectiveness of his or her performance (Hackman and Oldham 1976). Coworkers, customers, supervisors, and the work activity itself may provide feedback about one's job. Feedback may also be generated by comparing available performance information with job description and goals. Warr (1994) suggests that task feedback has an ∩-shaped relationship with affective commitment. A lack of feedback may cause employees to feel confused about their performance and increasing feedback tend to reduce feelings of uncertainty and ambiguity (Rosen et al. 2006). Feedback may increase affective commitment through enhancing the perceived meaningfulness of a job. Research has shown that pursuing meaning is an important goal in one's life (Ryan and Deci 2001) as experiencing meaning can promote wellbeing (King and Napa 1998). Humphrey et al. (2007)

suggests that feedback provides a chance for employees to learn about their performance and proximity to their goal. If employees believe that they are on the way towards goal accomplishment, they are likely to experience greater meaningfulness in their job. If employees learn that they are not moving towards goal accomplishment, having the ability to change their behavior and reduce discrepancies between current and target performance will allow them to find different paths toward goal accomplishment. In support, it has been shown that employees working in a supportive environment that provides reliable and high-quality feedback are likely to develop stronger affective commitment (Norris-Watts and Levy 2004). However, too much feedback may have negative effects. Deci (1972) suggests that too much negative feedback can threaten an employees' sense of competence and self determination whereas too much positive feedback can cause an employee to feel ingratiated. Therefore, we hypothesize that:

H3: When the level of task feedback is low or high, employees' affective commitment is lower than when task feedback is moderate.

Task identity refers to the degree to which a job requires the completion of a "whole" and identifiable piece of work (Hackman and Oldham 1976). It is expected to have an ∩-shaped relationship with affective commitment (Warr 1994). Pedrini et al. (2009) found that employees working in jobs with low task identity feel that they lack personal accomplishment. Feelings of boredom and meaninglessness are also prevalent among employees working in jobs with low task identity (Gemmill and Oakley 1992). Therefore, we expect the level of affective commitment to be low when task identity is low. Increasing task identity has been found to improve the situation (Dunham et al. 1994). However, when task identity is very high, employees are likely to feel solely accountable for the results of their work and this may result in stress and negatively impact affective commitment. In support, Lin and Hsieh (2002) found that task identity has an ∩-shaped relationship with organizational (measured as affective) commitment. Based on these, we hypothesize that:

H4: When the level of task identity is low or high, employees' affective commitment is lower than when task identity is moderate.

Task significance refers to the degree to which a job has a substantial impact on the lives or work of other people, whether within the immediate organization or in the external environment (Hackman and Oldham 1976). Unlike other job characteristics, task significance is expected to have a constant effect (De Jonge and Schaufeli 1998; Warr 1994). That is, increase in task significance will improve affective commitment until a plateau is reached and further increase in task significance will neither improve nor weaken affective commitment. Prior studies have shown that employees working in jobs with high task significance believe that their actions benefit others (social impact) and are valued by others (social worth) (Grant 2008). Such employees are likely to develop positive affective commitment towards their organization that has provided them with the legitimacy to do so. Their affective commitment may also improve as a result of experiencing the meaningfulness of their job. In line with these, Thatcher et al. (2002) found that task significance is positively related to organizational (measured as affective) commitment. Accordingly, we hypothesize that:

H5: Task significance is positively related to employees' affective commitment.

By definition, employees with high affective commitment have strong emotional attachment to, identification with, and involvement in their organization (Meyer and Allen 1991). Prior studies have shown that affective commitment motivates employees to contribute to their organizations' development by engaging in organization citizenship behavior (e.g., Paré and Tremblay 2007), which are voluntary behaviors that are neither part of an employee's role requirements nor formally rewarded by the organization (Organ and Ryan 1995). Specifically, affective commitment has been found to be a strong predictor of compliance behavior in a meta analysis (Organ and Ryan 1995). *Compliance behavior* refers to a class of organization citizenship behaviors aimed broadly towards doing things that are 'right and proper' for the sake of a whole system rather than for a specific person. Knowledge contribution to electronic repositories is largely a compliance behavior as the contributor's personally-held knowledge becomes a "public good" that may be used by anyone having access to the repositories (King and Marks 2008). On the other hand, some researchers suggest that instead of motivating employees to engage in activities beyond the call of duty, employees with strong affective commitment tend to define their job obligations in a broad and flexible manner to include activities not formally prescribed in job descriptions (e.g., Morrison 1994). Although these views differ on how affective commitment influences employees'

definition of roles, they both underline the potential significance of affective commitment on knowledge contribution. While there is a lack of direct evidence on the effect of affective commitment on knowledge contribution to electronic repositories, there is some indication that the effect may be salient. For example, Lin (2007) found that organizational commitment (measured in terms of affective commitment) is positively related to employees' sharing of job experience, expertise, ideas, and tips with co-workers. Matzler et al. (2011) found that affective commitment influences the documentation of knowledge in written form.

H6: Employees' affective commitment is positively related to their knowledge contribution to electronic repositories.

As discussed thus far, we expect that various aspects of job design influence employees' affective commitment, which in turn influences their knowledge contribution to electronic repositories. Further, we also hypothesize that affective commitment fully mediates the effect of job design on knowledge contribution because job design is a characteristic that is external to an individual. It is therefore unlikely to change behavior without impacting attitudes. This is in line with the theory of planned behavior, which posits that external variables influence behavior through shaping attitudes (Fishbein and Ajzen 1975). In support, Chen and Chiu (2009) found that the effects of job autonomy, task identity, and task significance on organizational citizenship behavior are mediated by their involvement in the organization (which is an aspect of affective commitment). Accordingly, we hypothesize that:

The effects of job autonomy (H6a), skill variety (H6b), task feedback (H6c), task identity (H6d), and task significance (H6e) on employees' knowledge contribution to electronic repositories are fully mediated by affective commitment.

Research Method

Data for assessing the proposed model was collected in a survey. The development of the survey instrument and collection of data are described next.

Construct Operationalization

All constructs were measured with items validated in prior studies. Instead of asking respondents to indicate whether they agree or disagree with a positively phrased sentence, we reworded all items measuring job characteristics to the question form in order to capture both very low and very high levels of job characteristics. To ensure consistency, we also reworded items measuring affective commitment and knowledge contribution to electronic repositories to the question form. Further, we eliminated adjectives (e.g., "considerable" in "considerable opportunity for independence") whenever appropriate to ensure that the items read neutral. All constructs were measured with reflective indicators, where all items are affected by an underlying latent construct and adding or dropping an item should not alter the conceptual domain of the construct (Jarvis et al. 2003).

Job autonomy, skill variety, task feedback, task identity, and task significance were measured with items validated by Morris and Venkatesh (2010), which was adapted from Hackman and Oldham's (1975) job diagnostic survey. Hackman and Oldham's (1975) job diagnostic survey is the most commonly used job design measure (Morgeson and Humphrey 2006). Morris and Venkatesh (2010) modified the original version by removing reverse-coded items to improve reliability and validity. The resultant scales demonstrated satisfactory reliability and validity in their study. *Affective commitment* was assessed with items adapted from the scale of affective organizational commitment validated by Rhoades et al. (2001). Items measuring *knowledge contribution to electronic repositories* were adapted from the scale of knowledge sharing behavior validated by Hsu et al. (2007) and the scale of electronic knowledge repository usage validated by Kankanhalli et al. (2005). All constructs were assessed with at least three items, each measured with a seven-point Likert scale. Most of the scales were anchored by "not at all" – "moderate" – "to a very great extent". All items are listed in Table 2.

Table 2. Survey Instrument

Job Autonomy (adapted from Morris and Venkatesh 2010): To what extent…
- JA1: …does your job have autonomy? Having autonomy means that you are allowed to decide on your own how to go about doing the work.
- JA2: ...does your job give you opportunity for independence and freedom in how you do the work?
- JA3: ...does your job give you chances to use your personal initiative and judgment in carrying out the work?

Skill Variety (adapted from Morris and Venkatesh 2010): To what extent…
- SV1: ...does your job have variety? Having variety means you are required to do many different things at work, using a variety of your skills and talents.
- SV2: ...does your job require you to use a number of complex or high-level skills?
- SV3: ...is your job complex and non-repetitive?

Task Identity (adapted from Morris and Venkatesh 2010): To what extent…
- TI1: ...does your job involve doing a whole and identifiable piece of work? A whole and identifiable piece of work means a complete piece of work that has an obvious beginning and end rather than only a small part of the overall piece of work.
- TI2: ...does your job provide you the chance to completely finish the pieces of work you begin?
- TI3: ...is your job arranged so that you can do an entire piece of work from beginning to end?

Task Significance (adapted from Morris and Venkatesh 2010): To what extent…
- TS1: ...is your job significant in general? A significant job means that the results of your work are likely to significantly affect the lives or wellbeing of other people.
- TS2: ...is your job one where a lot of other people can be affected by how well the work gets done?
- TS3: ...is your job significant and important in the broader scheme of things?

Affective Commitment (adapted from Rhoades et al. 2001): To what extent…
- AF1: …would you be happy to work at your organization until you retire?
- AF2: …do you feel that the problems faced by your organization are also your problems?
- AF3: …do you feel a sense of belonging to your organization?
- AF4: …do you feel personally attached to your organization?
- AF5: …does working at your organization have a great deal of personal meaning to you?
- AF6: …are you proud to tell others that you work at your organization?

Knowledge Contribution to Electronic Repositories (adapted from Hsu et al. 2007 and Kankanhalli et al. 2005)
- KC1: How often do you contribute work-related knowledge to your organization's electronic knowledge repositories? *(Never- Sometimes-Always)*
- KC2: How much time do you spend contributing work-related knowledge to your organization's electronic knowledge repositories? *(Very little – Some – Very much)*
- KC3: To what extent do you involve yourself in discussion of various topics rather than specific topics on your organization's electronic knowledge repositories?

* All items were measured with seven-point Likert scale anchored by "not at all" – "moderate" – "to a very great extent" unless otherwise indicated in italic parentheses.

Data Collection

The target population of this study is employees working in organizations that have implemented electronic knowledge repositories, especially those involved in knowledge-intensive professional work. To generate a suitable sample, we randomly selected 600 professionals working as doctors, engineers, and lawyers from several directories of certified professionals in Singapore. We contacted them by mail and invited those working in organizations that have implemented electronic knowledge repositories to complete a web-based survey. We received a total of 163 complete responses, representing a response rate of 27.1 percent.

Most of the respondents were employed as engineers (67 respondents, 41.1 percent), followed by lawyers (55 respondents, 33.7 percent) and doctors (41 respondents, 25.2 percent). The sample comprised of 80.4 percent males (131 respondents) and 19.6 percent females (32 respondents). Of the respondents, 36.8

percent (60 respondents) attained a doctoral degree and the remaining possessed a bachelor or master degree. The median age of the respondents was between 35 to 40 years old with average organization tenure of 4 years.

Data Analysis

Tests of Reliability and Validity

The survey instrument was tested for reliability, convergent validity, and discriminant validity. Reliability of each construct was assessed with Cronbach's alpha coefficient (see Table 3). All constructs achieved scores above the recommended 0.70 (Hair et al. 2009). Convergent validity was assessed by examining composite reliability and average variance extracted (AVE) by each construct (see Table 3). All composite reliabilities and AVEs were above the recommended level of 0.70 (Hair et al. 2009), indicating that the convergent validity of the instrument was satisfactory.

Table 3. Reliability, Validity, and Distribution Statistics

Construct	Mean	Standard Deviation	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Job autonomy (JA)	4.86	2.51	0.94	0.96	0.90
Skill variety (SV)	4.91	2.28	0.86	0.91	0.77
Task feedback (TF)	3.95	1.32	0.90	0.94	0.83
Task identity (TI)	4.86	2.43	0.92	0.95	0.86
Task significance (TS)	4.85	2.38	0.94	0.96	0.89
Affective commitment (AC)	4.08	2.33	0.93	0.94	0.74
Knowledge contribution (KC)	3.83	1.91	0.87	0.92	0.80

Discriminant validity was assessed by factor analysis and comparing construct correlations and square root of AVE. Similar to Morris and Venkatesh (2010), we conducted a factor analysis with direct oblimin rotation to allow for possibly correlated job design factors. The results indicated that all items loaded highly on their stipulated constructs but not highly on other constructs. The correlation matrix (see Table 4) shows that all the non-diagonal entries (i.e., construct correlation) did not exceed the bold diagonal entries (i.e., square root of AVE), indicating that the items of each construct correlated more highly with their own items than with items measuring other constructs (Fornell and Larcker 1981). The correlations ranged from 0.05 to 0.51, and the highest correlations were between an independent and the dependent variable in the proposed model (i.e., affective commitment and knowledge contribution). They therefore did not signify problems of multicollinearity, which exists between independent variables. We further assessed the extent of multicollinearity by calculating variance inflation factor (VIF). The resultant values of VIF ranged from 1.13 to 3.02, which were below the threshold value of 3.33 (Diamantopoulos and Winklhofer 2001). This suggests that multicollinearity is unlikely.

Table 4. Square Root of AVE vs. Correlation

Construct	JA	SV	TF	TI	TS	AC	KC
Job autonomy	**0.95**						
Skill variety	0.35	**0.88**					
Task feedback	0.27	0.30	**0.91**				
Task identity	0.26	0.28	0.37	**0.93**			
Task significance	0.19	0.23	0.30	0.30	**0.94**		
Affective commitment	0.14	0.17	0.29	0.35	0.29	**0.86**	
Knowledge contribution	0.12	0.05	0.13	0.24	0.24	0.51	**0.89**
* Bold diagonal is square root of AVE							

We also assessed the extent of common method bias with Harman's one-factor test by entering all constructs into an unrotated principal components factor analysis. The threat of common method bias is high if a single factor accounts for more than 50% of the variance. Our results indicated that none of the factors significantly dominated the variance and common method bias was therefore unlikely.

Tests of Hypotheses

To test the linear and curvilinear effects, we conducted hierarchical polynomial regression analysis that allows us to assess quadratic instead of linear regression equations. Our hierarchical analysis involved three steps. Similar to linear regression, the control variables were entered in the first step, followed by the five job characteristics in the next step. In the last step, quadratic terms computed as the square of the job characteristics were entered to test for their curvilinear effects. All data were scale centered by subtracting the midpoint of the scale from the measured value before creating the quadratic terms to reduce multicollinearity between the linear and quadratic terms (Aiken and West 1991).

Results of hypotheses testing show that skill variety (H2) and task identity (H4) have curvilinear effects on affective commitment as expected (see Table 5). Task significance (H5) is positively related to affective commitment as hypothesized. Affective commitment, in turn, is positively related employees' knowledge contribution to electronic repositories (i.e., H6 is supported). Contrary to our hypotheses, the curvilinear effects of job autonomy (H1) and task feedback (H4) are not significant. The model without curvilinear effects explained 32 percent of the variance in affective commitment while the model with curvilinear effects explained 41 percent. Affective commitment explained 28% of the variance in knowledge contribution.

Table 5. Tests of Hypotheses

Dependent Variable: Affective Commitment (AC)							
	Step 1		**Step 2 R^2=0.32**		**Step 3 R^2=0.41**		**Result**
	Beta	**T-Value**	**Beta**	**T-Value**	**Beta**	**T-Value**	
Age	0.11	1.09	0.12	1.24	0.08	1.17	
Education	-0.02	-0.26	-0.03	-0.32	0.00	-0.23	
Gender	0.08	0.92	0.04	0.45	0.01	0.76	
Job position	0.13	1.34	0.12	1.39	0.10	1.35	
Organization tenure	0.04	0.40	0.03	0.36	0.03	0.49	
Job autonomy			0.17	1.75*	0.14	1.69*	
Skill variety			0.10	1.07	0.11	1.31	
Task feedback			0.08	1.00	0.07	0.92	
Task identity			0.09	0.96	0.10	0.83	
Task significance			0.26	1.98*	0.24	2.02*	H5 is supported
JA^2					-0.10	-0.99	H1 is not supported
SV^2					-0.30	-2.74**	H2 is supported
TF^2					-0.09	-1.13	H3 is not supported
TI^2					-0.18	-1.95*	H4 is supported
TS^2					-0.06	-0.56	
Dependent Variable: Knowledge Contribution (KC)							
	Step 1		**Step 2 R^2=0.28**				**Result**
Age	0.05	0.61	0.04	0.54			
Education	0.06	0.74	0.07	0.69			
Gender	0.04	0.69	0.03	0.55			
Job position	-0.04	-0.71	-0.06	-0.61			
Organization tenure	0.07	0.97	0.07	0.89			
JA^2			-0.10	-0.79			(H6a is not supported since JA2→AC is not significant)
SV^2			-0.03	-0.21			H6b is supported
TF^2			-0.08	-0.64			(H6c is not supported since TF^2→AC is not significant)
TI^2			-0.05	-0.48			H6d is supported
TS			0.06	0.83			H6e is supported
Affective commitment	0.45	4.76***	0.42	4.34***			H6 is supported
*Significant at p<0.05, **p<0.01, ***p<0.001							

To assess whether affective commitment mediates the effects of the job characteristics, we calculated Sobel mediation test statistic and its variations (i.e., Aroian's test statistic and Goodman's test statistic)

(Edwards and Lambert 2007) for aspects of job characteristics that were found to have significant effect. A mediation relationship was considered significant if two or more of these test statistics were significant. The results in Table 6 show that the effects of all the significant job characteristics (i.e., skill variety, task identity, task significance) are mediated by affective commitment.

Table 6. Tests of Mediation Effects

Mediating Relationship	Sobel Statistic	Aroian Statistic	Goodman Statistic	Result
SV^2 → AC → KC	-2.30*	-2.26*	-2.35**	Significantly mediated
TI^2 → AC → KC	-1.77*	-1.73*	-1.81*	Significantly mediated
TI → AC → KC	1.82*	1.78*	1.87*	Significantly mediated
* Test of mediation effect was not conducted for JA2 and TF2 since their effects on affective commitment were not significant.				

We then tested whether the significant job characteristics were fully mediated by affective commitment as hypothesized. As suggested by Baron and Kenny (1986), we regressed knowledge contribution on the job characteristics and affective commitment. None of the job characteristics had significant effect on knowledge contribution when affective commitment is controlled. This indicates that the effects of skill variety (H6b), task identity (H6d), and task significance (H6e) were fully mediated by affective commitment.

Discussion

In sum, the results of this study show that job design influences employees' knowledge contribution to electronic repositories through shaping their affective commitment. We found that different job characteristics have different effects. For skill variety and task identity, increasing their levels initially improves affective commitment but their effects taper off at high levels. This is the first study to examine the curvilinear effects of these job characteristics in the context of knowledge contribution. The findings support Warr's (1994) model where these job characteristics are proposed to have ∩-shaped curvilinear effects. Unlike skill variety and task identity, we found that task significance was positively related to affective commitment, even at every high level. This also supports Warr's (1994) model and provides further evidence for the positive linear effect of task significance found in prior studies (e.g., Thatcher et al. 2002). Contrary to hypotheses, the curvilinear effects of job autonomy and task feedback were found to be not significant.

Although the hypothesized curvilinear effect of job autonomy was not significant, it had a positive linear effect on employees' affective commitment. This suggests that the lack of job autonomy is detrimental to employees' affective commitment and increasing autonomy can improve the situation. More importantly, the effect of job autonomy does not turn negative when job autonomy is very high: employees working on high-autonomy jobs continue to develop positive affective commitment toward their organization, which in turn motivates them to contribute knowledge. We expected employees working on high-autonomy jobs to develop less favorable affective commitment because they are likely to experience more uncertainties and stress due to the need to make many decisions. However, it might be that autonomy itself provided opportunities for employees to reduce uncertainties by allowing them to schedule work such that more information can be gathered before making decisions. Further, learning in the process of information search may increase the perceived meaningfulness of their job and effectively offset negative sentiments associated with uncertainties. More qualitative studies are needed to gain a deeper understanding of the effects of autonomy on affective commitment.

We found that the curvilinear effect of task feedback was not significant. Its linear effect was also not significant. These suggest that while task feedback may guide employees towards their goals (Humphrey et al. 2007), it neither increases nor decreases affective commitment. A possible reason for this unexpected finding may be that it is necessary to consider the valence of feedback. Recent studies have shown that positive and negative feedback have differential effects on affective commitment (e.g., Belschak and Den Hartog 2009). Positive feedback is likely to generate emotional comfort within employees which motivates attachment to an organization while negative feedback may create discomfort that induces avoidance (Maertz and Griffeth 2004). These two effects might have canceled each other out in our analysis where they were not distinguished, leading to the finding that task feedback has no

significant effect. Therefore, our findings may not necessarily refute those of prior studies (e.g., Norris-Watts and Levy 2004). To better understand the true effect of task feedback, further studies need to conceptualize and measure positive and negative task feedback separately.

Implications for Theory and Research

This study advances theoretical development in knowledge management in general and knowledge contribution to electronic repositories in particular. The results show that different aspects of job design have different effects on employees' knowledge contribution through shaping their affective commitment. Specifically, job autonomy and task significance have positive linear effects as suggested by the job design theory (Hackman and Oldham 1976). This provides additional empirical support for their effects found in prior studies. We also found that skill variety and task identity have ∩-shaped curvilinear effects as posited in Warr's (1994) Vitamin Model. These suggest that future research need to account for the separate effects of various aspects of job design to avoid oversimplifying the phenomenon. Future research may also seek to identify the optimal mix of job characteristics that considers the curvilinear effects and synergy among job characteristics to maximize affective commitment and promote knowledge contribution.

Prior studies have mostly focused on showing the motivating features of an enriched job design and neglected its negative impacts. The findings of this study show that beyond a certain level, skill variety and task identity can over stimulate employees and have detrimental impacts. Therefore, it is important for future research to look beyond strictly linear effects to better understand the effects of job design.

This study is one of the first to empirically examine the effects of job design on knowledge contribution to electronic repositories. Based on the job design theory and Warr's Vitamin Model, and prior research on organizational citizenship behavior, we have shown that affective commitment is the mechanism through which job design influences knowledge contribution. Without examining the mediating effect of affective commitment, the curvilinear effects of skill variety and task identity would have been masked. This study has thus provided subtle yet important theoretical understanding of the effects of job design.

Implications for Practice

Our findings suggest that increasing the levels of job autonomy and task significance can motivate employees to contribute knowledge to electronic repositories through improving their affective commitment. Job autonomy may manifest as work scheduling autonomy, work methods autonomy, and decision-making autonomy (Morgeson and Humphrey 2006). In practice, one way of increasing job autonomy is through the use of autonomous workgroups, where members are allowed to allocate work among themselves, organize schedules, address customer requirements, and recruit new members. Not only does working in such workgroups enhance employees' job autonomy, they have also been found to lead to better coordination, more expertise, and increased innovation (Cohen et al. 1996). Job autonomy may also be increased through participative management, where employees are allowed to participate in decision making, goal setting, and the design of organizational change initiatives. Telecommunicating has also been shown to increase job autonomy as it requires employees to self regulate their work behavior (Raghuram et al. 2003). On the other hand, the use of employee monitoring through technologies such as card swipe systems, location sensing technologies, and camera should be limited.

Task significance may be increased by clarifying employees' individual contribution to moral ideals and higher-order goals such as department or organizational objectives. Managers may also provide more opportunities for employees to have direct contact with the (internal or external) beneficiaries of their work to better understand the impact of their work on others (Grant 2008) through organizing focus groups, public presentations, and other socializing events.

We also found that skill variety and task identity have curvilinear effects on affective commitment. In other words, both very low and very high levels of skill variety and task identify have undesirable effects. This has important implications for practice, as employees working in jobs with high skill variety and task identity have the greatest potential to develop valuable know-how and gain extensive experience of the value-creation process. They therefore constitute the critical mass of knowledge contributors that would increase the usefulness of a knowledge repository and attract other users (Peddibhotla and Subramani

2007). Ironically, our findings suggest that this group may not contribute as much as the organization would have hoped. It is therefore important to manage the levels of skill variety and task identity as their marginal benefit decreases at high levels and may disappear at extreme levels. Managers may consider gathering employees' opinions about the level of their job variety and task identity regularly and make adjustments accordingly.

Limitations and Suggestions for Future Research

This study has several limitations that should be taken into consideration when interpreting the findings. First, as mentioned earlier, we adopted the conceptualization of task feedback from Hackman and Oldham (1976) and did not distinguish between positive and negative task feedback. This might have hampered our ability to detect the effect of task feedback since positive task feedback is likely to increase affective commitment whereas negative feedback may have a negative impact (Maertz and Griffeth 2004). Future research should therefore conceptualize and measure them separately to better capture their differential effects.

Second, it has been suggested that the distribution of a variable may influence the statistical power of detecting its curvilinear effect (McClelland and Judd 1993). The distribution with higher statistical power is one where one fourth of the observations are at either extreme of the variable and the remaining half of the observations is exactly halfway between those two extremes. In this study, data were collected in a survey and it was therefore not feasible to manipulate the distribution of the job characteristics that are hypothesized to have a curvilinear effect. As a result, weak curvilinear effects might have gone undetected. Nevertheless, this study provided some preliminary evidence that certain aspects of job design may have curvilinear rather than linear effect. Future studies may consider conducting experiments to further examine their effects in more controlled settings. However, it must be noted that over sampling extreme observations may produce an inflated estimate of the variance explained (r^2).

Third, Warr's Vitamin Model focuses on the effects of job design and does not consider individual and social characteristics. Recent studies have found that individual characteristics in the Big Five personality framework such as consciousness, extraversion, and neuroticism interact with job design to influence organizational citizenship behavior (e.g., Raja and Johns 2010). This suggests that it may be fruitful to examine whether individual characteristics moderate the curvilinear effects of job design. Other work-related individual characteristics such as locus of control and task self-efficacy found to have significant influence on affective commitment in a meta analysis (Meyer et al. 2002) may also provide new insights. Further, the proposed model may be extended by considering characteristics of the social realm such as employees' social network structure and their embeddedness in a social network to improve the variance explained in knowledge contribution to electronic repositories.

Fourth, our data were collected in a cross-sectional survey from a convenient sample. More studies using a longitudinal design to collect data from other samples and contexts are necessary to further validate our findings.

Conclusion

Motivating employees to contribute to electronic knowledge repositories has been a daunting challenge in knowledge management initiatives. In this study, we have shown that affective commitment is a significant factor motivating employees' knowledge contribution to electronic repositories and it is shaped by the job characteristics of job autonomy, skill variety, task identity, and task significance. Most notably, we found that employees working in jobs with very high skill variety and task identity might develop less favorable affective commitment. If future research continues to observe curvilinear effects for these aspects of job design, managers will need to be mindful of the diminishing return from increasing their levels in job design in the promotion of knowledge contribution.

Acknowledgements

This study was funded by Japan Society for the Promotion of Science under research grant number 23730345.

References

Ahuja, M.K., Chudoba, K.M., Kacmar, C.J., McKnight, D.H., and George, J.F. 2007. "ICT Road Warriors: Balancing Work-Family Conflict, Job Autonomy, and Work Overload to Mitigate Turnover Intentions," *MIS Quarterly* (31:1), pp. 1-17.

Aiken, L.S., and West, S.G. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage Publications.

Argote, L., and Miron-Spektor, E. 2011. "Organizational Learning: From Experience to Knowledge," *Organization Science* (Articles in Advance).

Baron, R.M., and Kenny, D.A. 1986. "The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology* (51:6), pp. 1173-1182.

Belschak, F.D., and Den Hartog, D.N. 2009. "Consequences of Positive and Negative Feedback: The Impact on Emotions and Extra-Role Behaviors," *Applied Psychology* (58:2), pp. 274-303.

Bock, G.-W., Zmud, R.W., Kim, Y.-G., and Lee, J.-N. 2005. "Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate," *MIS Quarterly* (29:1), pp. 87-111.

Champoux, J.E. 1980. "A Three Sample Test of Some Extensions to the Job Characteristics Model of Work Motivation," *The Academy of Management Journal* (23:3), pp. 466-478.

Chen, C.-C., and Chiu, S.-F. 2009. "The Mediating Role of Job Involvement in the Relationship between Job Characteristics and Organizational Citizenship Behavior," *The Journal of Social Psychology* (149:4), pp. 474-494.

Cohen, S.G., Ledford, G.E., and Spreitzer, G.M. 1996. "A Predictive Model of Self-Managing Work Team Effectiveness," *Human Relations* (49:5), pp. 643-676.

De Jonge, J., and Schaufeli, W.B. 1998. "Job Characteristics and Employee Well-Being: A Test of Warr's Vitamin Model in Health Care Workers Using Structural Equation Modelling," *Journal of Organizational Behavior* (19:4), pp. 387-407.

de Vries, R.E., van den Hooff, B., and de Ridder, J.A. 2006. "Explaining Knowledge Sharing," *Communication Research* (33:2), pp. 115-135.

Deci, E.L. 1972. "The Effects of Contingent and Noncontingent Rewards and Controls on Intrinsic Motivation," *Organizational Behavior and Human Performance* (8:2), pp. 217-229.

Deci, E.L., Koestner, R., and Ryan, R.M. 1999. "A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation," *Psychological Bulletin* (125:6), pp. 627-668.

Diamantopoulos, A., and Winklhofer, H.M. 2001. "Index Construction with Formative Indicators: An Alternative to Scale Development," *Journal of Marketing Research* (38:2), pp. 269-277.

Dunham, R.B., Grube, J.A., and Castañeda, M.B. 1994. "Organizational Commitment: The Utility of an Integrative Definition," *Journal of Applied Psychology* (79:3), pp. 370-380.

Durcikova, A., and Gray, P. 2009. "How Knowledge Validation Processes Affect Knowledge Contribution," *Journal of Management Information Systems* (25:4), pp. 81-107.

Edwards, J., and Lambert, L. 2007. "Methods for Integrating Moderation and Mediation: A General Analytical Framework Using Moderated Path Analysis," *Psychological Methods* (12:1), pp. 1-22.

Fishbein, M., and Ajzen, I. 1975. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, M.A.: Addison-Wesley.

Fornell, C., and Larcker, D. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research* (18:1), pp. 39-50.

Foss, N.J., Minbaeva, D.B., Pedersen, T., and Reinholt, M. 2009. "Encouraging Knowledge Sharing among Employees: How Job Design Matters," *Human Resource Management* (48:6), pp. 871-893.

Fullagar, C.J., and Kelloway, E.K. 2009. "Flow at Work: An Experience Sampling Approach," *Journal of Occupational and Organizational Psychology* (82:3), pp. 595-615.

Gagné, M. 2009. "A Model of Knowledge-Sharing Motivation," *Human Resource Management* (48:4), pp. 571-589.

Ganster, D.C., and Fusilier, M.R. 1989. "Control in the Workplace," in *International Review of Industrial and Organizational Psychology*, C. L. Cooper and I.T. Robertson (eds.). Oxford, England: John Wiley & Sons, pp. 235-280.

Gemmill, G., and Oakley, J. 1992. "The Meaning of Boredom in Organizational Life," *Group & Organization Management* (17:4), pp. 358-369.

Grant, A.M. 2008. "The Significance of Task Significance: Job Performance Effects, Relational Mechanisms, and Boundary Conditions," *Journal of Applied Psychology* (91:1), pp. 108-124.
Grant, A.M. 2011. "Giving Time, Time after Time: Work Design and Sustained Employee Participation in Corporate Volunteering," *Academy of Management Review* (forthcoming).
Hackman, J.R., and Oldham, G.R. 1975. "Development of the Job Diagnostic Survey," *Journal of Applied Psychology* (60:2), pp. 159-170.
Hackman, J.R., and Oldham, G.R. 1976. "Motivation through the Design of Work: Test of a Theory," *Organizational Behavior and Human Performance* (16:2), pp. 250-279.
Hair, J.F., Black, W.C., Babin, B.J., and Anderson, R.E. 2009. *Multivariate Data Analysis* (7th ed.), Upper Saddle River, N.J.: Prentice Hall.
He, W., and Wei, K.-K. 2009. "What Drives Continued Knowledge Sharing? An Investigation of Knowledge-Contribution and -Seeking Beliefs," *Decision Support Systems* (46:4), pp. 826-838.
Hislop, D. 2003. "Linking Human Resource Management and Knowledge Management Via Commitment: A Review and Research Agenda," *Employee Relations* (25:2), pp. 182-202.
Honold, L. 1997. "A Review of the Literature on Employee Empowerment," *Empowerment in Organisations* (5:4), pp. 202-212.
Hsu, M.-H., Ju, T.L., Yen, C.-H., and Chang, C.-M. 2007. "Knowledge Sharing Behavior in Virtual Communities: The Relationship between Trust, Self-Efficacy, and Outcome Expectations," *International Journal of Human-Computer Studies* (65:2), pp. 153-169.
Humphrey, S.E., Nahrgang, J.D., and Morgeson, F.P. 2007. "Integrating Motivational, Social, and Contextual Work Design Features: A Meta-Analytic Summary and Theoretical Extension of the Work Design Literature," *Journal of Applied Psychology* (92:5), pp. 1332-1356.
Jarvenpaa, S.L., and Staples, D.S. 2001. "Exploring Perceptions of Organizational Ownership of Information and Expertise," *Journal of Management Information Systems* (18:1), pp. 151-183.
Jarvis, C.B., MacKenzie, S.B., and Podsakoff, P.M. 2003. "A Critical Review of Construct Indicators and Measurement Model Misspecification in Marketing and Consumer Research," *Journal of Consumer Research* (30:3), pp. 199-218.
Johns, G. 2010. "Some Unintended Consequences of Job Design," *Journal of Organizational Behavior* (31:2-3), pp. 361-369.
Kankanhalli, A., Tan, B.C.Y., and Wei, K.K. 2005. "Contributing Knowledge to Electronic Knowledge Repositories: An Empirical Investigation," *MIS Quarterly* (29:1), pp. 113-143.
King, L.A., and Napa, C.K. 1998. "What Makes a Life Good?" *Journal of Personality and Social Psychology* (75:1), pp. 156-165.
King, W.R., and Marks, J., P. V. 2008. "Motivating Knowledge Sharing through a Knowledge Management System," *OMEGA: International Journal of Management Science* (36:1), pp. 131-146.
Lin, C.-P. 2007. "To Share or Not to Share: Modeling Tacit Knowledge Sharing, Its Mediators and Antecedents," *Journal of Business Ethics* (70:4), pp. 411-428.
Lin, S.-L., and Hsieh, A.-T. 2002. "Constraints of Task Identity on Organizational Commitment," *International Journal of Manpower* (23:2), pp. 151-165.
Maertz, C.P., and Griffeth, R.W. 2004. "Eight Motivational Forces and Voluntary Turnover: A Theoretical Synthesis with Implications for Research," *Journal of Management* (30:5), pp. 667-683.
Mathieu, J.E., and Farr, J.L. 1991. "Further Evidence for the Discriminant Validity of Measures of Organizational Commitment, Job Involvement, and Job Satisfaction," *Journal of Applied Psychology* (76:1), pp. 127-133.
Matzler, K., Renzl, B., Mooradian, T., von Krogh, G., and Mueller, J. 2011. "Personality Traits, Affective Commitment, Documentation of Knowledge, and Knowledge Sharing," *International Journal of Human Resource Management* (22:2), pp. 296-310.
McClelland, G.H., and Judd, C.M. 1993. "Statistical Difficulties of Detecting Interactions and Moderator Effects," *Psychological Bulletin* (114:2), pp. 376-390.
Menon, S.T. 1995. *Employee Empowerment: Definition, Measurement and Construct Validation*. Canada: McGill University.
Meyer, J.P., and Allen, N.J. 1991. "A Three-Component Conceptualization of Organizational Commitment," *Human Resource Management Review* (1:1), pp. 61-89.
Meyer, J.P., Stanley, D.J., Herscovitch, L., and Topolnytsky, L. 2002. "Affective, Continuance, and Normative Commitment to the Organization: A Meta-Analysis of Antecedents, Correlates, and Consequences," *Journal of Vocational Behavior* (61:1), pp. 20-52.

Morgeson, F.P., and Humphrey, S.E. 2006. "The Work Design Questionnaire (WDQ): Developing and Validating a Comprehensive Measure for Assessing Job Design and the Nature of Work," *Journal of Applied Psychology* (91:6), pp. 1321-1339.

Morris, M.G., and Venkatesh, V. 2010. "Job Characteristics and Job Satisfaction: Understanding the Role of Enterprise Resource," *MIS Quarterly* (34:1), pp. 143-161.

Morrison, E.W. 1994. "Role Definitions and Organizational Citizenship Behavior: The Importance of the Employee's Perspective," *The Academy of Management Journal* (37:6), pp. 1543-1567.

Mowday, R.T., Steers, R.M., and Porter, L.W. 1979. "The Measurement of Organizational Commitment," *Journal of Vocational Behavior* (14:2), pp. 224-247.

Muller, R.M., Spiliopoulou, M., and Lenz, H.J. 2005. "The Influence of Incentives and Culture on Knowledge Sharing," *Proceedings of the 38th Annual Hawaii International Conference on System Sciences*, Big Island, Hawaii, January 3-6.

Nair, N., and Vohra, N. 2010. "An Exploration of Factors Predicting Work Alienation of Knowledge Workers," *Management Decision* (48:4), pp. 600-615.

Naus, F., van Iterson, A., and Roe, R.A. 2007. "Value Incongruence, Job Autonomy, and Organization-Based Self-Esteem: A Self-Based Perspective on Organizational Cynicism," *European Journal of Work and Organizational Psychology* (16:2), pp. 195-219.

Norris-Watts, C., and Levy, P.E. 2004. "The Mediating Role of Affective Commitment in the Relation of the Feedback Environment to Work Outcomes," *Journal of Vocational Behavior* (65:3), pp. 351-365.

O'Reilly III, C., and Chatman, J. 1986. "Organizational Commitment and Psychological Attachment: The Effects of Compliance, Identification, and Internalization on Prosocial Behavior," *Journal of Applied Psychology* (71:3), pp. 492-499.

Organ, D.W., and Ryan, K. 1995. "A Meta-Analytic Review of Attitudinal and Dispositional Predictors of Organizational Citizenship Behavior," *Personnel Psychology* (48:4), pp. 775-802.

Paré, G., and Tremblay, M. 2007. "The Influence of High-Involvement Human Resources Practices, Procedural Justice, Organizational Commitment, and Citizenship Behaviors on Information Technology Professionals' Turnover Intentions," *Group & Organization Management* (32:3), pp. 326-357.

Peddibhotla, N.B., and Subramani, M.R. 2007. "Contributing to Public Document Repositories: A Critical Mass Theory Perspective," *Organization Studies* (28:3), pp. 327-346.

Pedrini, L., Magni, L.R., Giovannini, C., Panetta, V., Zacchi, V., Rossi, G., and Placentino, A. 2009. "Burnout in Nonhospital Psychiatric Residential Facilities," *Psychiatric Services* (60:11), pp. 1547-1551.

Raghuram, S., Wiesenfeld, B., and Garud, R. 2003. "Technology Enabled Work: The Role of Self-Efficacy in Determining Telecommuter Adjustment and Structuring Behavior," *Journal of Vocational Behavior* (63:2), pp. 180-198.

Raja, U., and Johns, G. 2010. "The Joint Effects of Personality and Job Scope on in-Role Performance, Citizenship Behaviors, and Creativity," *Human Relations* (63:7), pp. 981-1005.

Rhoades, L., Eisenberger, R., and Armeli, S. 2001. "Affective Commitment to the Organization: The Contribution of Perceived Organizational Support," *Journal of Applied Psychology* (86:5), pp. 825-836.

Robertson, M., and Hammersley, G.O.M. 2000. "Knowledge Management Practices within a Knowledge-Intensive Firm: The Significance of the People Management Dimension," *Journal of European Industrial Training* (24:2-4), pp. 241-253.

Rosen, C.C., Levy, P.E., and Hall, R.J. 2006. "Placing Perceptions of Politics in the Context of the Feedback Environment, Employee Attitudes, and Job Performance," *Journal of Applied Psychology* (91:1), pp. 211-220.

Ryan, R.M., and Deci, E.L. 2001. "On Happiness and Human Potentials: A Review of Research on Hedonic and Eudaimonic Well-Being," *Annual Review of Psychology* (52), pp. 141-166.

Scott, W.E. 1966. "Activation Theory and Task Design," *Organizational Behavior and Human Performance* (1:1), pp. 3-30.

Sels, L., Janssens, M., and Van Den Brande, I. 2004. "Assessing the Nature of Psychological Contracts: A Validation of Six Dimensions," *Journal of Organizational Behavior* (25:4), pp. 461-488.

Thatcher, J.B., Liu, Y., and Stepina, L.P. 2002. "The Role of the Work Itself: An Empirical Examination of Intrinsic Motivation's Influence on IT Workers' Attitudes and Intentions," in: *Proceedings of the 2002 ACM SIGCPR Conference on Computer Personnel Research*. Kristiansand, May 14-16.

Warr, P. 1994. "A Conceptual Framework for the Study of Work and Mental Health," *Work & Stress* (8:2), pp. 84-97.
Wasko, M.M., and Faraj, S. 2005. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), pp. 35-57.
Watson, S., and Hewett, K. 2006. "A Multi-Theoretical Model of Knowledge Transfer in Organizations: Determinants of Knowledge Contribution and Knowledge Reuse," *Journal of Management Studies* (43:2), pp. 141-173.
Webster, J., and Watson, R. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *MIS Quarterly* (26:2), pp. xiii-xxiii.
Wiesner, M., Windle, M., and Freeman, A. 2005. "Work Stress, Substance Use, and Depression among Young Adult Workers: An Examination of Main and Moderator Effect Model," *Journal of Occupational Health Psychology* (10:2), pp. 83-96.
Xie, J.L., and Johns, G. 1995. "Job Scope and Stress: Can Job Scope Be Too High?" *The Academy of Management Journal* (38:5), pp. 1288-1309.